The Builder.

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THE late frightful loss of life in the Kenilworth-street sewer involves circumstances which affect the whole community, and, as might have been expected, has greatly excited a large portion of it. The number of letters we have received on the subject, were there no other evidence of the excitement we allude to, would suffice to prove it,—letters calling on us to do all sorts of impossible and unjust things, and in the majority of cases calculated to work a great amount of injury to individuals and property, and very little public good.

The inquiry before the coroner has been pursued very rigorously: it occupied three long days, very contradictory evidence was given, and much personal feeling evinced. We must give, briefly, some few particulars.

Warwick-street and Kenilworth-street are two rising and incomplete streets in a new district now taking shape under the hands of Mr. Thomas Cubitt, adjoining the Grosvenor Canal, not far from Vauxhall-bridge-road, and wherein a large amount of capital has already been invested. Warwick-street has a sewer communicating at one end, by a side street, with the Grosvenor Canal (as the means of flushing), and discharging itself into the King's Scholars' Pond sewer, in Vauxhall-bridge-road. Kenilworth-street, wherein there are but six houses and three of these uninhabited, runs into Warwick-street at an angle, and has a sewer that will ultimately discharge itself into the Thames. At present, however, it is built only to the extent of the land likely to be immediately brought into use, where it is closed by a brick wall, and finds vent into the Warwick-street sewer.*

The metropolitan sewers, as our readers know, are very properly not permitted to run one into another at right angles, but by a *curved junction*, so as to throw the subsidiary stream into the line of the main current. Had the intended permanent discharge of the Kenilworth-street sewer been into the Warwick-street sewer, the junction would have been thus formed; but, as we have said, this was not the case, and in order that a body of water might be brought into the former from the canal, by means of the Warwick-street sewer, the connection curved the other way, so as to *meet* the current, and, as a matter of course, would receive a portion of the sewage flowing down the Warwick-street sewer, if there were no flap, or other mechanical arrangement to prevent it;—and there was not. This was the "reversed junction," concerning which so much has been said.

Now, it was in the butt-ended sewer in Warwick-street that the poor men found their death; and when Messrs. John Phillips and Gotto, the commissioners' officers, went to inquire into the accident, they found, on examining the trench which had been opened over the crown of the sewer, two layers of lime refuse used in purifying gas, and were led to deny that the emanations from the sewage were, "by any possibility," the cause of the accident, and to attribute it to gas emanating from this lime refuse, and carried down into the sewer by the percolation of surface water. Dr. Ure analyzed the lime refuse and the deposit in the sewer, and agreed with them in attributing the poisonous gases in the sewer, which he said included "*prussic acid, or sulphocyanogen, poisons,*" to "the layer of gas lime imprudently shot as a filling-up rubbish over the sewer."*

Our general remarks last week will show what credence we gave to this theory. The tendency of it, together with Mr. Phillips's evidence, was to shift the blame on to anybody's shoulders but those of the officers of the commission, and Mr. Cubitt found it not merely to fall on his, but by inference to threaten serious injury to the estate. It was proved that the sewers were better built than in many other places; had been constructed wholly under the direction of the commissioners; that he had now no control over them whatever, could not even enter them, and that his tenants paid rates for their maintenance and repair. He felt it too bad," then, we are imagining, that any injurious imputation should rest on him. At the adjourned inquest, therefore, he brought down Mr. William Allen Miller, Professor of Chemistry at King's College; Mr. Dugald Campbell, Demonstrator of Chemistry at University College; and Mr. Phillips, Chemist and Curator of the Museum of Practical Geology, who completely disproved the assertion that the gas refuse was the cause of the disaster, asserted that *no prussic acid or cyanogen compounds* could be detected in the sewer, and wound up a joint written report, which they put in, by saying,—

"In conclusion, we beg to express our decided conviction that the deaths in question were occasioned by the presence of sulphuretted hydrogen, generated from the ordinary contents of sewers in a state of stagnation, and the absence of a sufficient quantity of atmospheric air, and that the lime waste had nothing to do with the accident in question; also that its presence in the road materials, as described, can be in no way prejudicial to health. We wish to add, that if the precaution had been taken of ventilating the sewer, and of destroying the noxious gases by the introduction of chlorine gas, no loss of life would have been occasioned."

Beyond this, Dr. Lyon Playfair (of whom, by the way—such is fame!—the worthy coroner, Bedford, had never heard, calling him "Fairplay," and everything but Tiger instead of Lyon), came down on the part of the commissioners of sewers themselves, to their credit be it said, and, in a piece of singularly clear and logical evidence, disproved at once and for ever the "refuse theory," admitting, however, that to a person not a chemist, the *à priori* idea that the gas lime had caused the mischief was a very probable one.†

The jury, after an hour and a half's consultation, found that the deceased men "died from the inhalation of noxious gas generated in a neglected and unventilated sewer situate in Kenilworth-street;" and added, "the jury unanimously consider the commissioners and officers of the metropolitan sewers are much to blame for having neglected to avail themselves of the unusual advantages offered from the local situation of the Grosvenor canal for the purpose of flushing the sewers in this district."

We should not discharge our duty if we failed to protest against the tone adopted towards Mr. Phillips, both by Mr. Cubitt's able solicitor, Mr. Hopgood, who allowed feeling on this occasion to swamp his usual good taste, and, with much less excuse, by one of the jury. We allude to it for the sake of other witnesses who may be in the same position, but say nothing further, as both gentlemen withdrew their observations. Phillips made a great mistake in persisting in the assertion, that there could be no great accumulation of refuse from house drainage in the fatal sewer because there were only three inhabited houses in the street which drained into it, although reminded of the reversed junction, which must *necessarily* take into the sewer a large amount of sewage that would deposit before it flowed out again. Moreover, the miserable state of the Warwick-street sewer was well known. We find it thus described in the "Descriptive Report of the State of the Sewers in the Westminster District," for the subterranean survey, under the date Sept. 2, 1848:—"Kenilworth-street.—Has two feet of deposit, and the smell so bad that the leveller's watch turned quite black in an hour!" The wonder is, that the poor leveller was not himself levelled. On this occa-

* The sewer in Kenilworth-street is of brickwork, 418 feet in length, 4 feet high by 2 feet 6 inches wide, and is a portion of a sewer, leave to build which was granted by the commissioners in November, 1847. It was built in January, 1848.

* We understand that the quantity of gas lime interspersed with the other materials in the piece of road 418 feet in length, is about twenty cart loads of gas lime to about 8,000 of other materials.

† Dr. Playfair said:—"On the crown of the sewer, below the lower layer of gas lime, there is a layer of clayey earth, and this contains iron; then comes a layer of gas lime, above that again another layer of clay, in some places coming up to the upper layer of gas lime—in others mixed with a layer of sand, and then above all a layer of clay. The upper layer of gas lime gives to water a solution of sulphuret, with other compounds, which do not enter into this inquiry. This solution of sulphuret, under certain conditions, produces sulphuretted hydrogen—as, for example, by the action of carbonic acid dissolved in rain water. The lower layer of gas lime does not contain a trace of a sulphuret, that is, nothing that could produce this sulphuret of hydrogen or anything injurious to life. It contains a small trace of cyanide in the substance which is supposed to produce prussic acid. I then proceeded to ascertain if there was any evidence of percolation of the soluble substance to the strata below from the upper bed of gas refuse. I first found that, on mixing the earth with water, no soluble sulphuret was obtained. That showed that there was no soluble sulphuret below the gas lime; but I found that there was evidence of a percolation downwards of this soluble sulphuret, and my proofs are these:—I observed that, immediately under the upper layer of gas lime, where it was in junction with the clay, the clayey earth was exceedingly black, and that this blackness decreased as I went downwards. The further away from the upper layer of gas lime, the less black did it become, and I found that this blackness was owing to the presence of sulphuret of iron, which the soluble sulphuret had formed by acting on the iron in the clay. By digesting this black substance in an acid, abundance of sulphuret of hydrogen was produced, and there was much more from the upper portion than from that beneath. The acid which I used was muriatic acid, for with carbonic acid there would be no evolution of sulphuretted hydrogen. I then examined the clayey earth on the top of the sewer, in order to ascertain if there was evidence of the sulphuret reaching so far. In certain parts I found a small quantity; in certain other parts I did not find a trace. I therefore thought it possible that the soluble sulphuret, percolating the soil from the upper stratum of gas lime, might be deprived of its noxious properties by the iron in the clay, and proceeded to put this to the test of experiment. I took a strong solution of sulphuret from the sewer-water, on the supposition that if it took its sulphuret from the soluble sulphuret of calcium it must pass through the clay without being arrested by it. I accordingly took the sewer-water and filtered it through the lowest bed of clay—that is to say, I made an artificial filter, by placing some of the earth of the clay in a filter, and mixing it with the water from the sewer. I then took the clear liquid which was filtered through, to see if it contained any sulphuret. I mixed some white lead with the filtered sewage water, and the white lead has, as the jury will see, been turned black by the presence of the sulphuret. I then took the same sewage-water which gave this black colour, and filtered it through a portion of the lowest bed of clay, and found that it was entirely deprived of sulphuret, and that white lead put into it was not blackened. I found that the whole of it was taken up by the iron in the clay, and that none had passed through in solution. I then thought it probable that the iron in the soil had arrested the sulphuret in its passage; but it was necessary to have confirmatory tests of this. I took a portion of the sulphuret in the sewer, and filtered it, and on putting some of the mortar therein I found that it became of a green colour from a portion of iron in the mortar. I carefully examined the mortar round the bricks in the sewer, in order to see if this green colour was produced, and I did not find the slightest trace of it. I then put the matter to a further test. If the cyanic compounds found in the gas refuse had filtered into the sewer-water, I should find them still in the sewer-water, because there could be no prussic acid present. There was in this sewer-water an excess of ammonia, and prussic acid and ammonia are incompatible. The cyanide of ammonia would be present, but not prussic acid. To determine this point, I examined a portion of the sewer-water taken up in my presence. Another portion was furnished by Mr. Phillips, but in neither could I find a trace of any compound of cyanogen. Thus, then, to recapitulate, there was the evidence that there was a percolation of sulphuret from the upper layer of gas lime; that it was arrested by the iron, and could not pass through the lower layer of clay without being taken up, and that the mortar in the bricks of the sewer was not coloured. Lastly, there the evidence that there was no compound of cyanogen in the water: from all which facts I drew the conclusion that the gas lime had nothing to do with the sulphuret in the sewer."